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**Schmid et al.**

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(54) **TOY VEHICLE LAUNCHER**

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***A63H 17/00*** (2006.01)

(52) **U.S. Cl.**
CPC ..... ***A63H 17/008*** (2013.01)

(58) **Field of Classification Search**
CPC ..... A63H 17/008; A63H 29/20; A63H 29/24
USPC ..... 446/429
See application file for complete search history.

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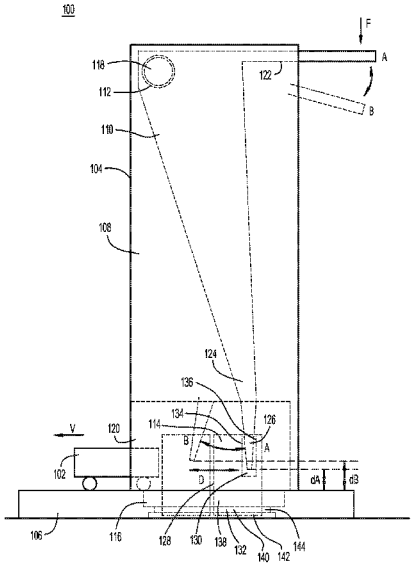
(57) **ABSTRACT**

A toy vehicle launcher translates a substantially vertical activation movement into a substantially lateral movement that launches a toy vehicle. The end of a lever arm used in the activation engages a vertical channel in a toy vehicle engagement mechanism. The vertical channel allows the end of the lever arm to move vertically within the channel with respect to the toy vehicle engagement mechanism as the lever arm rotates and the toy vehicle engagement mechanism moves laterally. The toy vehicle engagement mechanism engages a guide track in a base of the launcher. The guide track defines a lateral path that the toy vehicle engagement mechanism travels when moving between a loading configuration and a launching configuration. Thus, vertical movement from the activation is reduced in the transfer to the lateral toy vehicle launch.

**20 Claims, 13 Drawing Sheets**



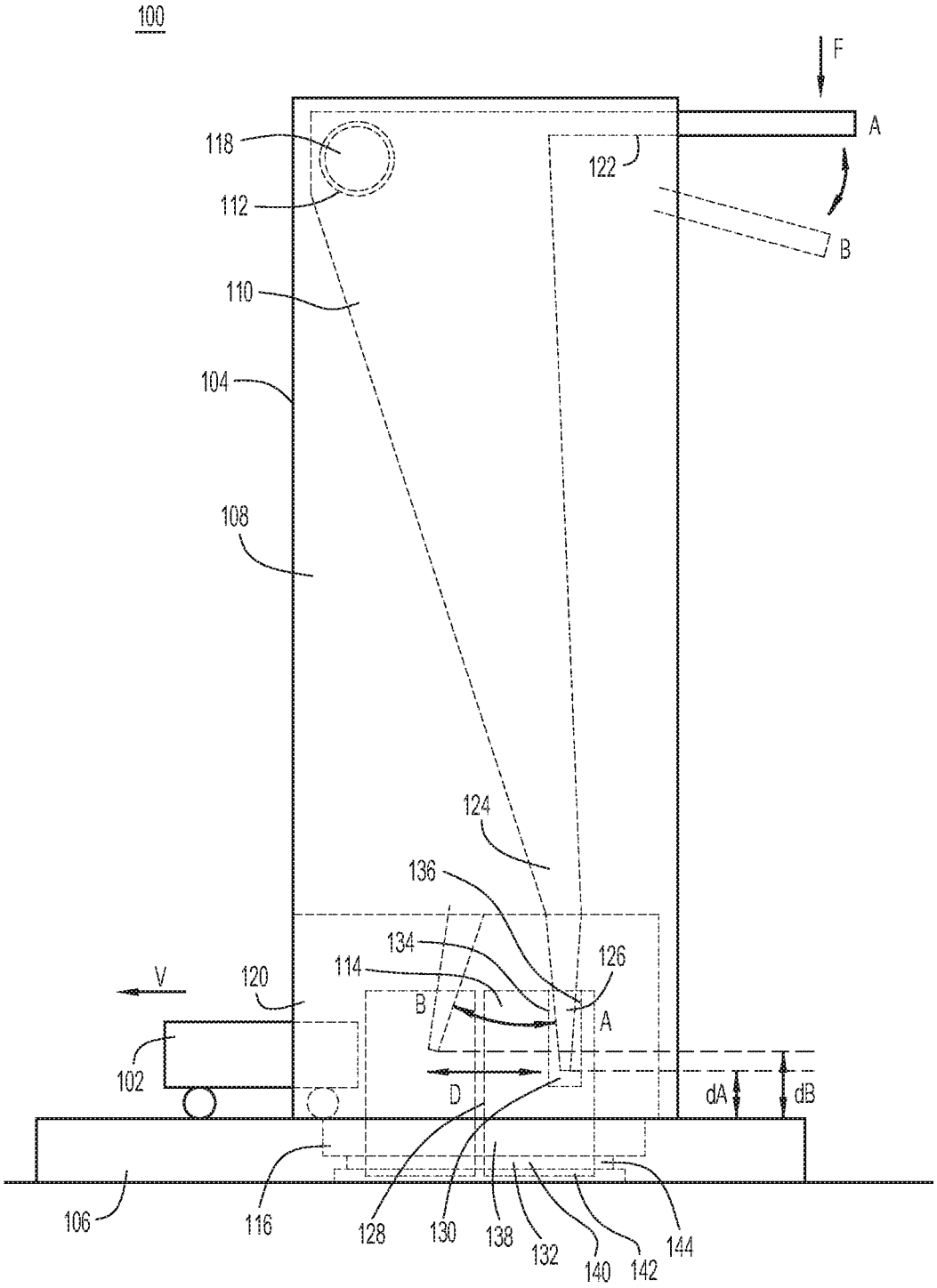

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FIG.1

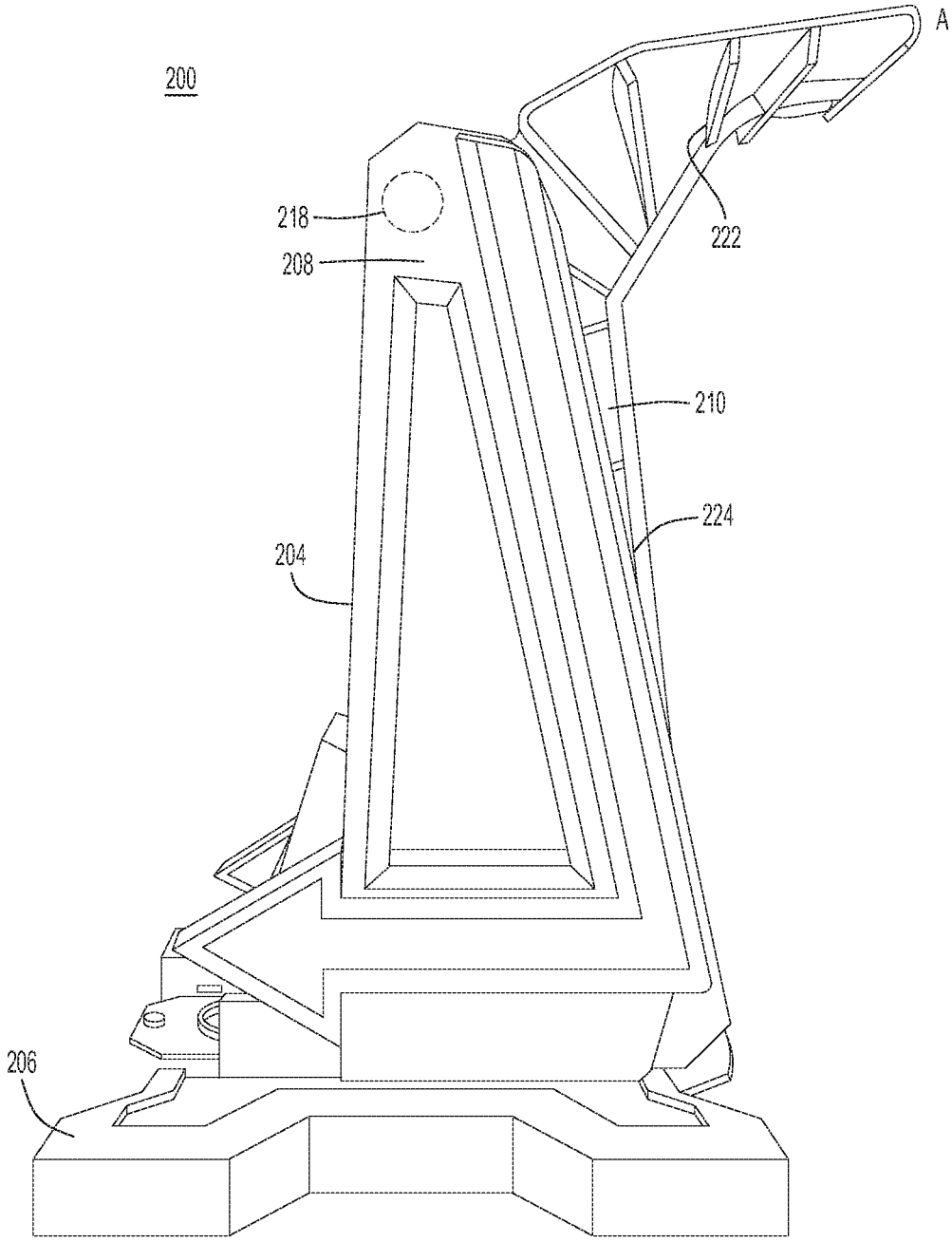


FIG.2

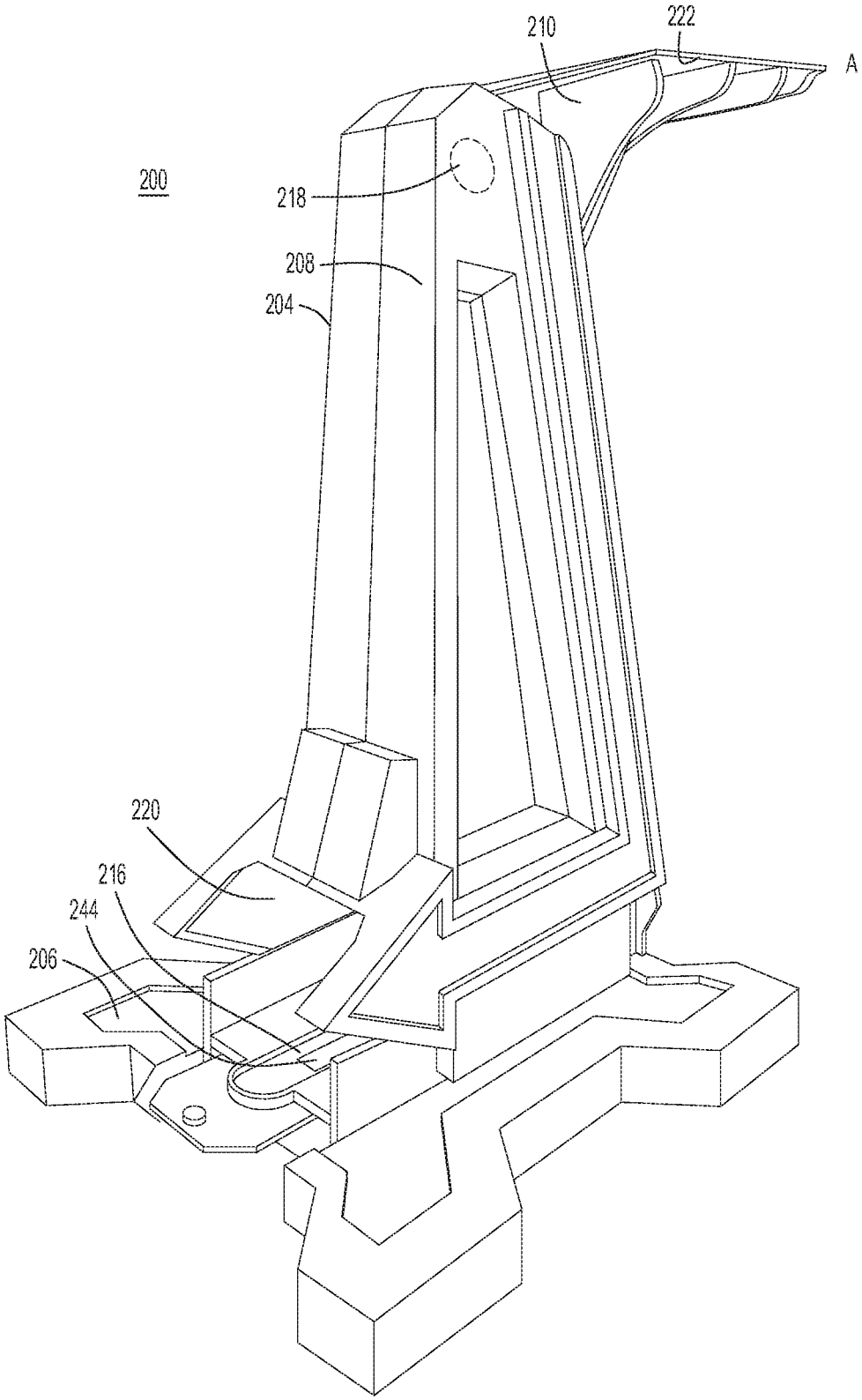


FIG.3

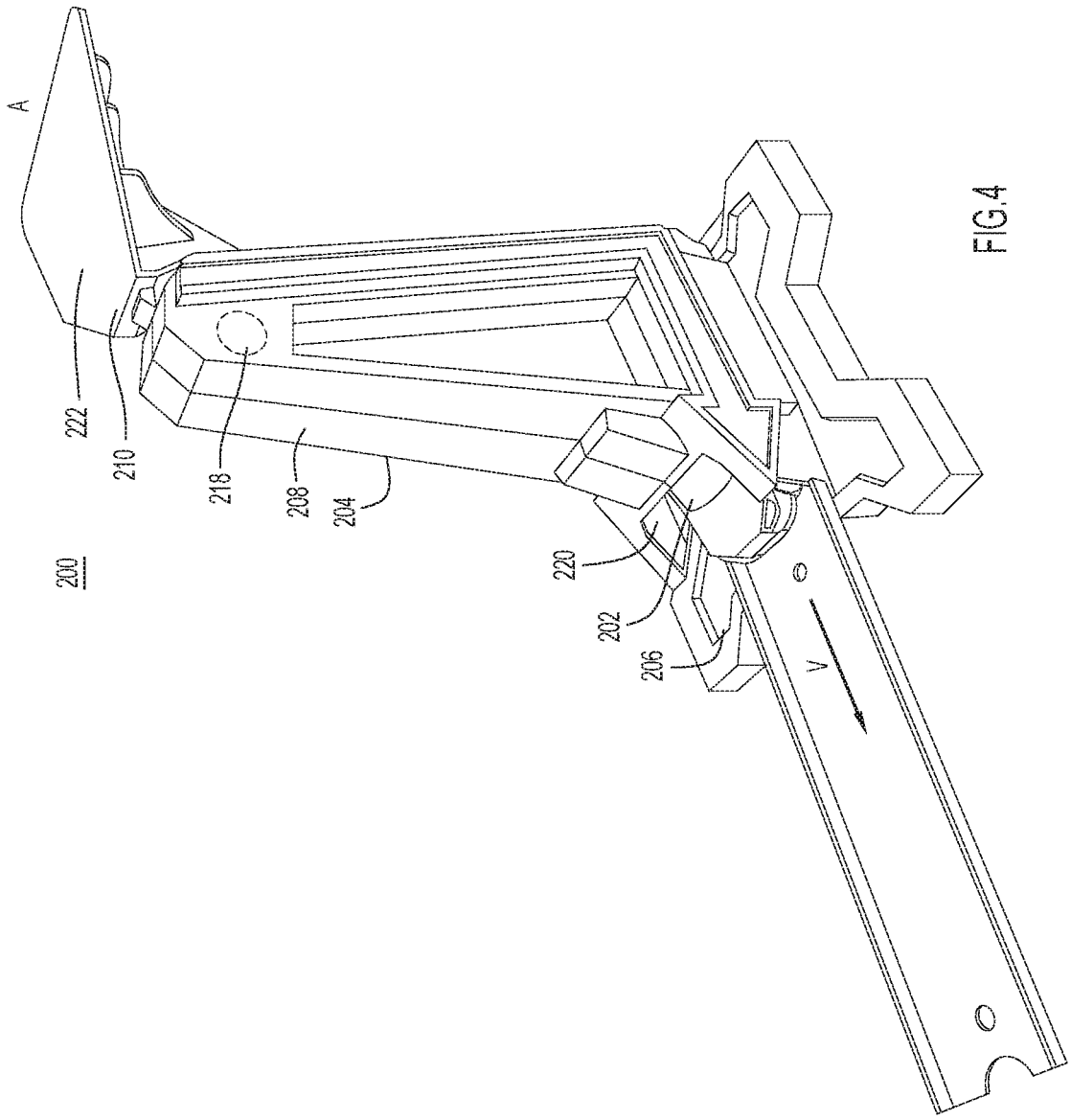


FIG.4

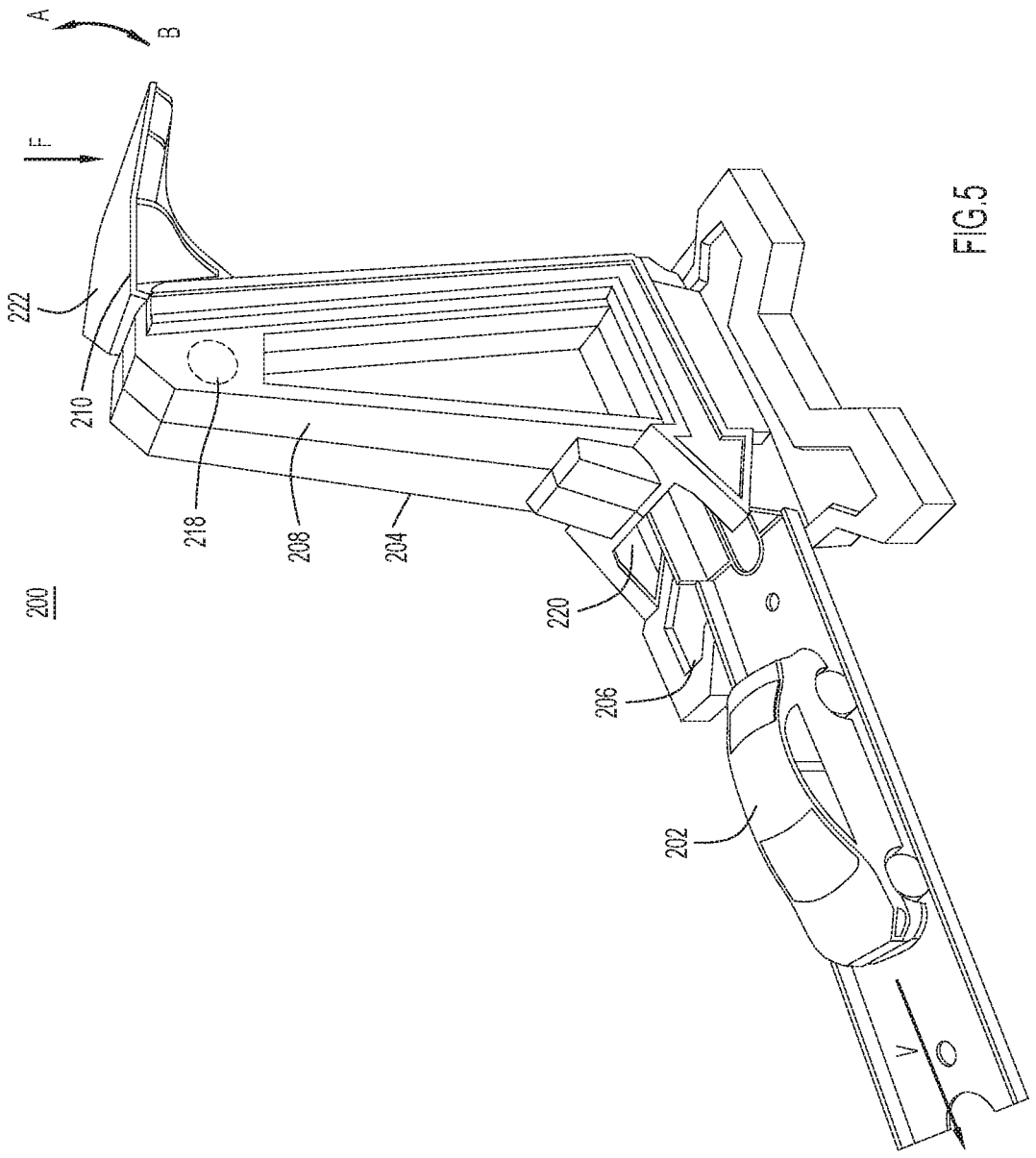


FIG.5

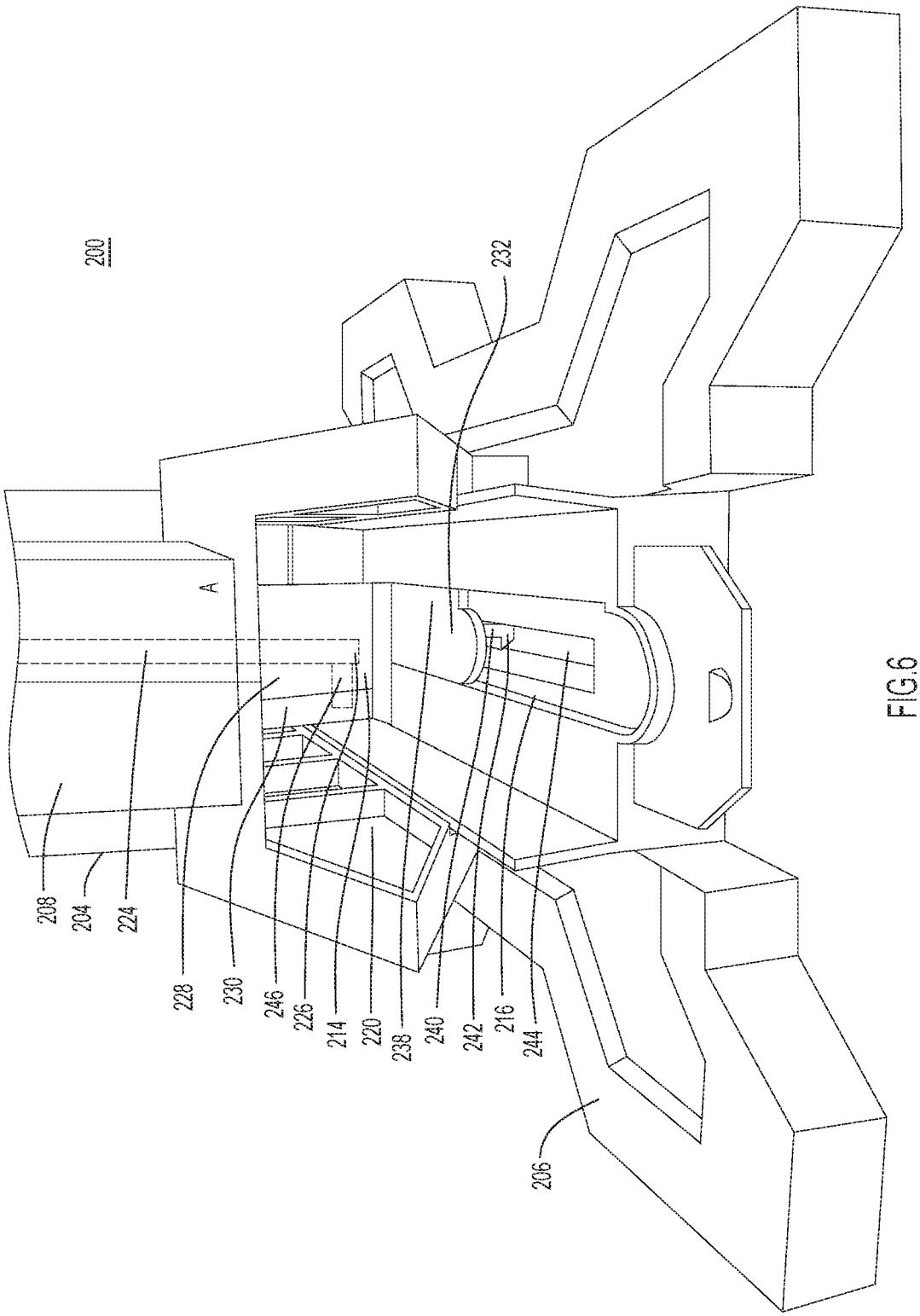
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FIG.6

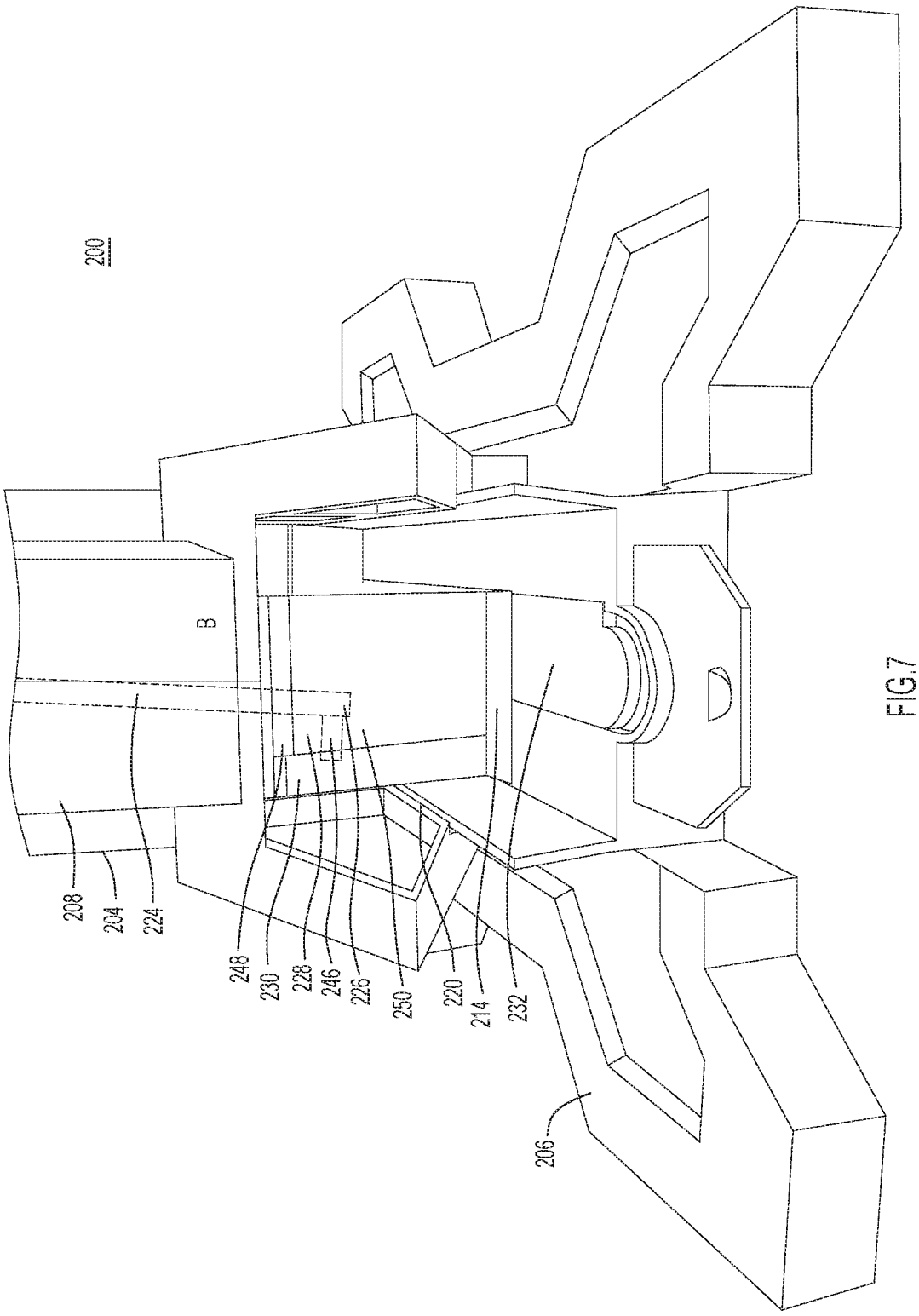


FIG.7

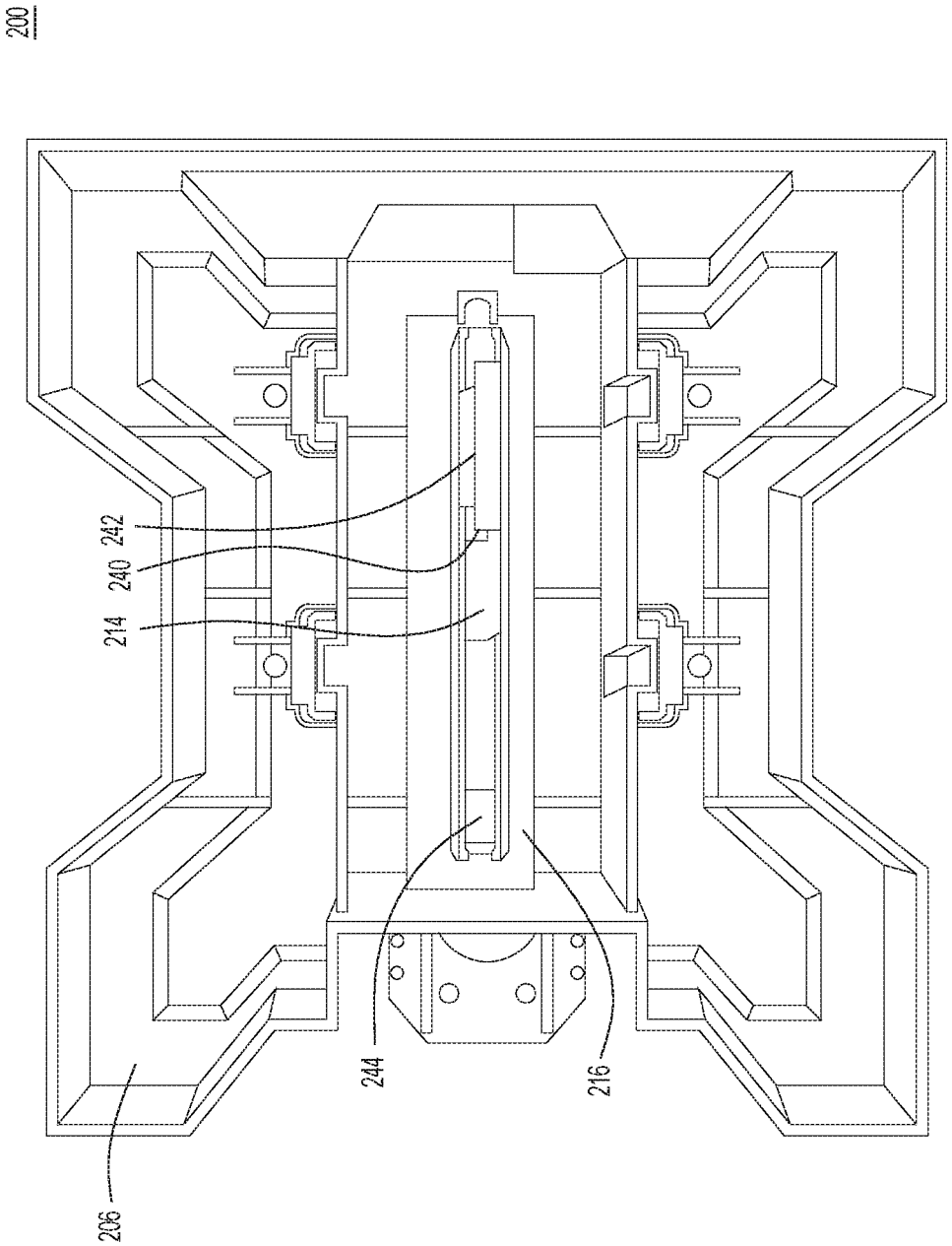


FIG.8

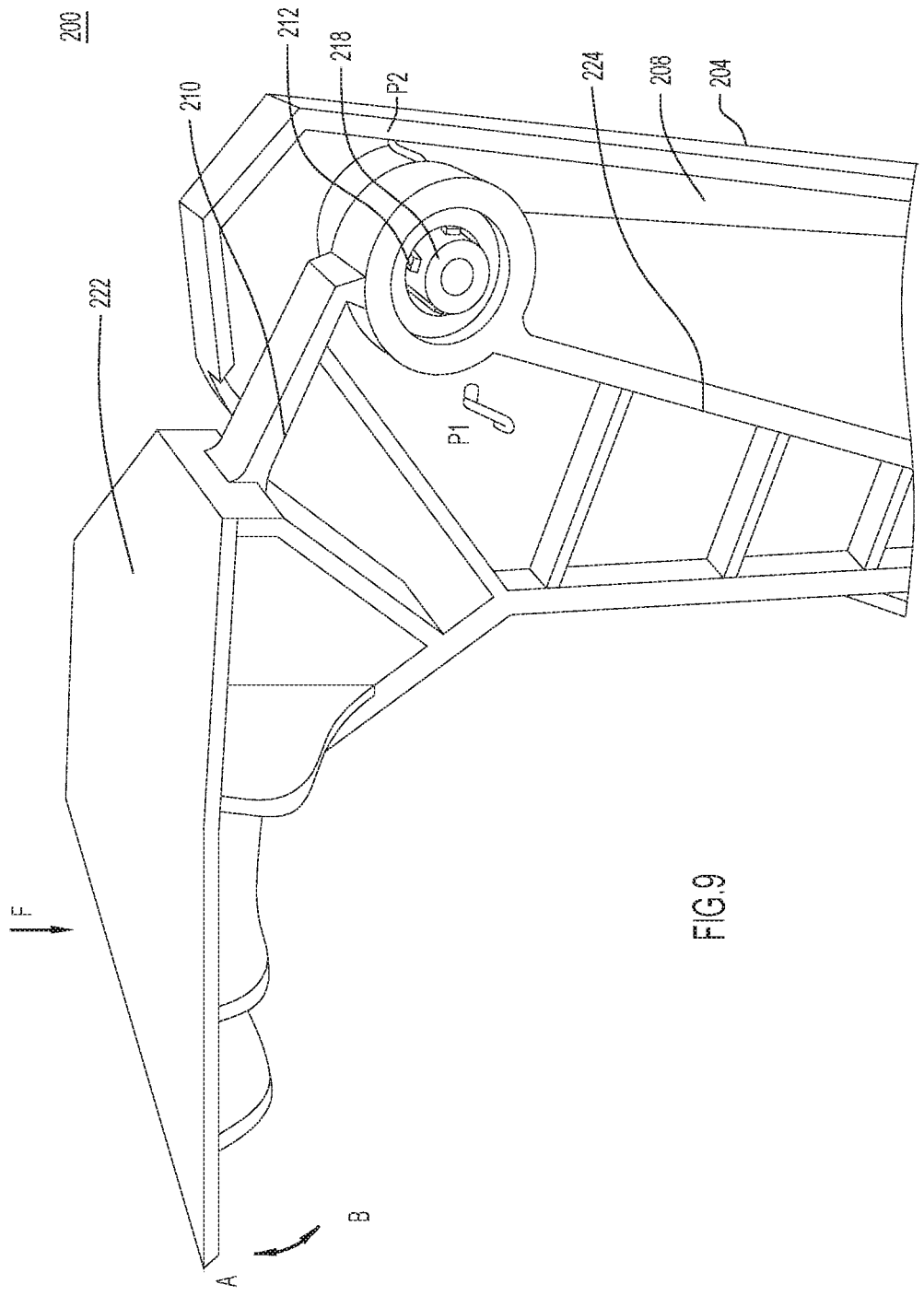


FIG.9

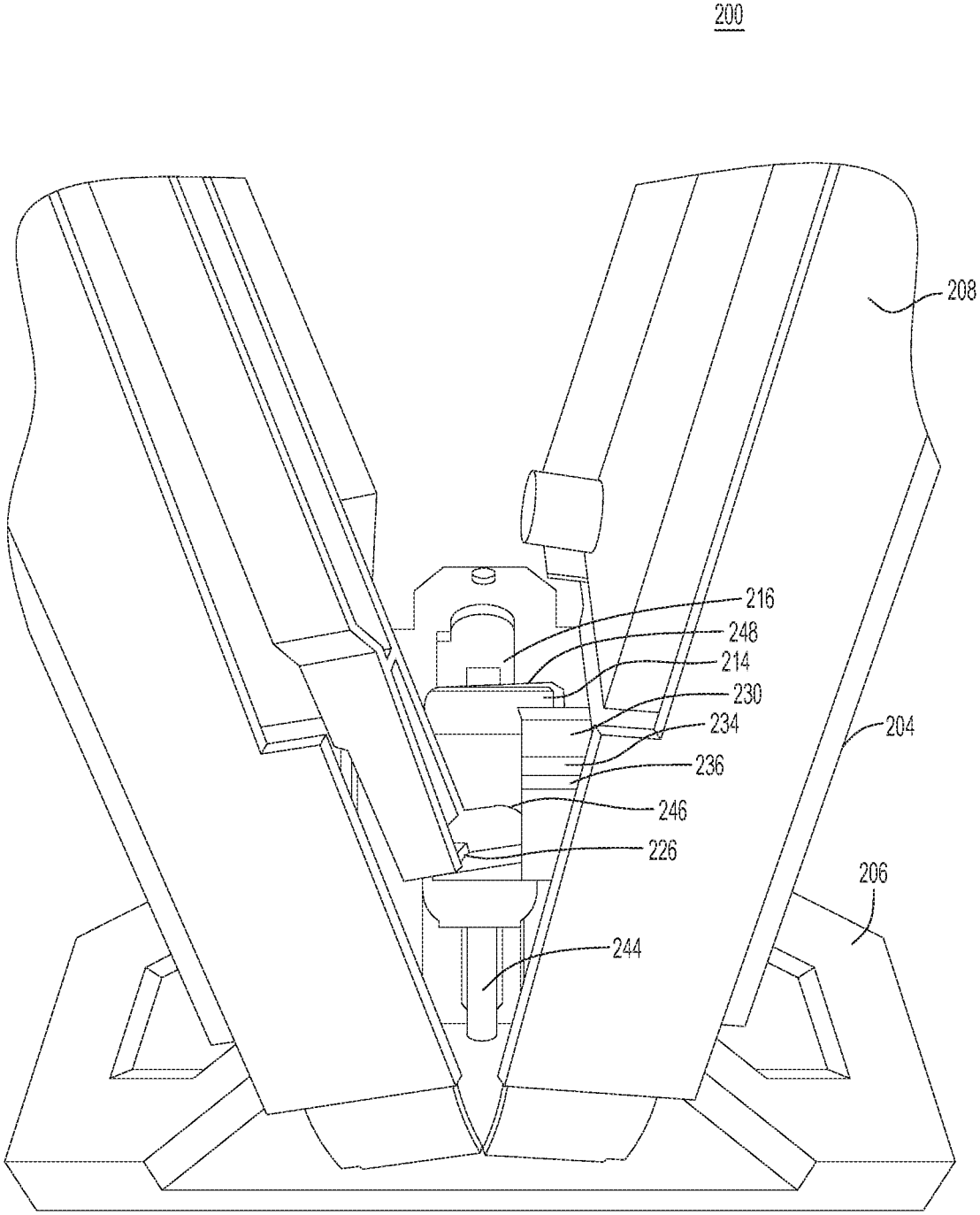


FIG.10

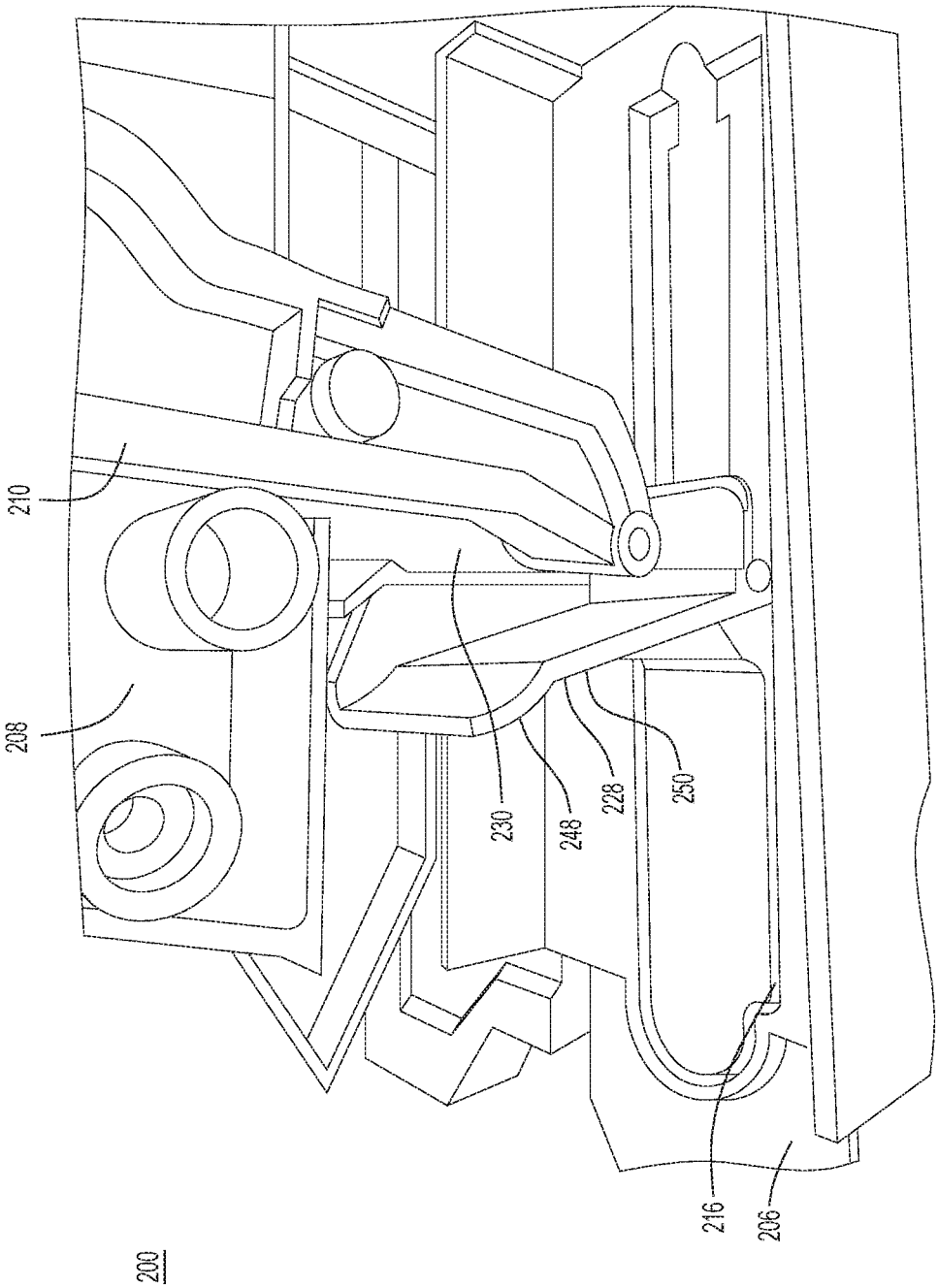


FIG.11

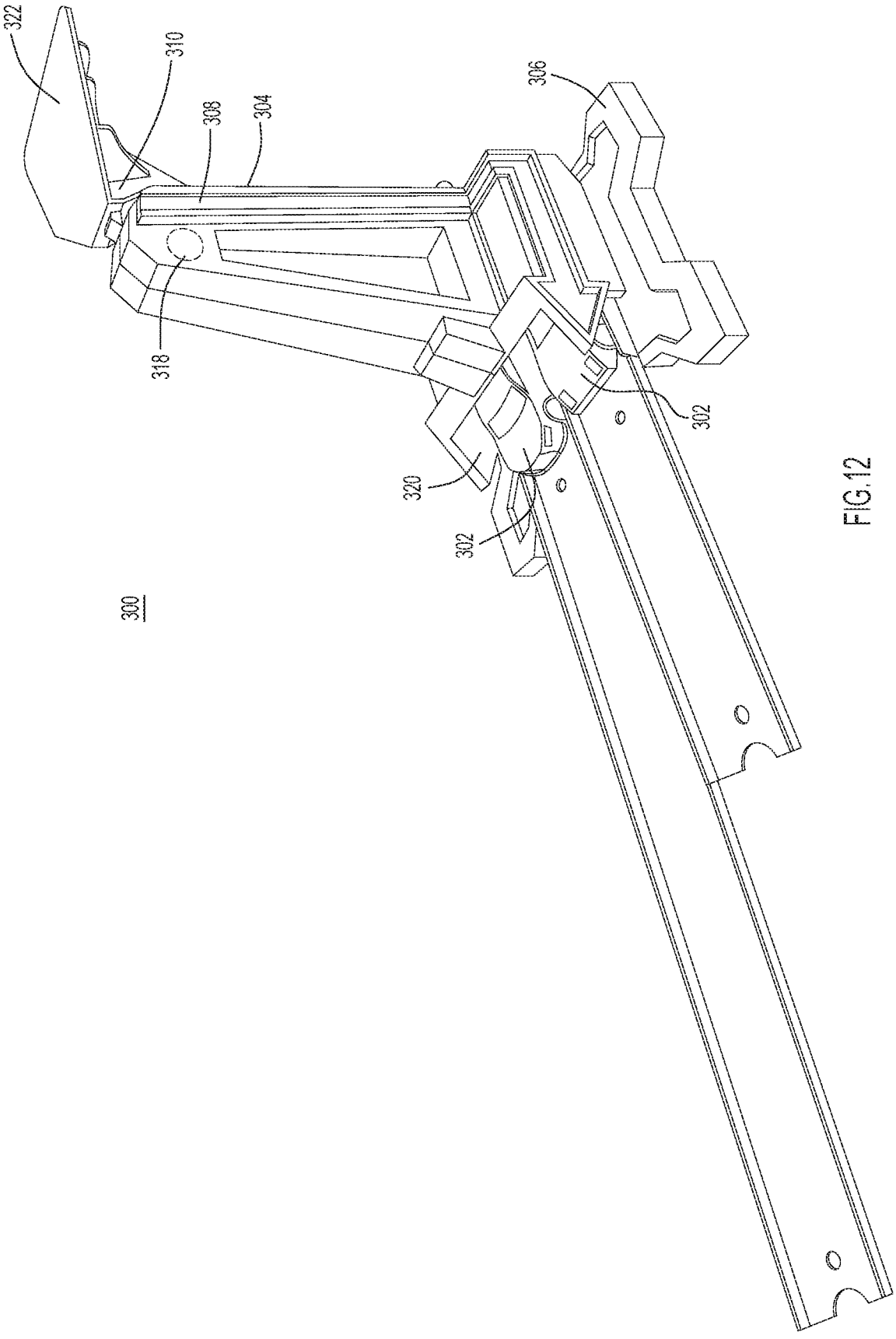


FIG.12

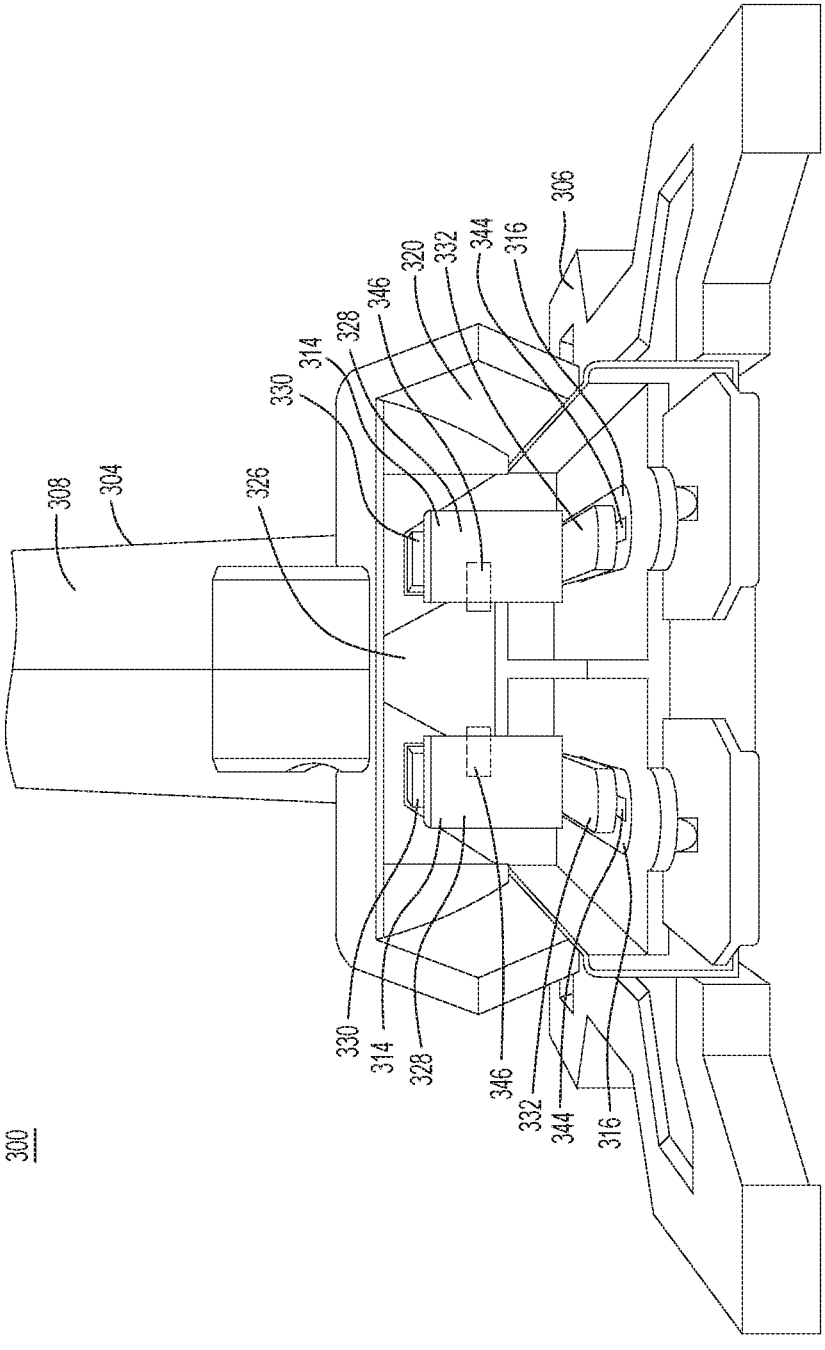


FIG.13

# TOY VEHICLE LAUNCHER

## FIELD OF THE INVENTION

This invention relates generally to a toy vehicle launcher system and, more particularly, to a toy vehicle launcher that converts a vertical activation motion into a lateral launch of the toy vehicle.

## BACKGROUND

Systems that launch toy vehicles have long been a source of entertainment for children of all ages. Children enjoy a variety of track configurations and continually seek new toy vehicle launcher features to enhance the play experience. The variation in themes, features, and arrangements sparks the imagination of a child and provides continued engagement that adds to the play value.

While various devices have previously been provided to launch toy vehicles onto a track or at a target structure, there remains opportunity to further enhance the play experience by providing new and unique toy vehicle launching systems. Some existing toy vehicle launchers are powered by a child rather than by stored energy. Some of those child-powered toy vehicle launchers include a dampener above the exit of the launcher to keep the toy vehicle moving in a forward direction. It would therefore be advantageous to provide a toy vehicle launcher that further enhances the excitement and amusement offered to children as they engage in such play and reduces or eliminates the need for a dampener above the exit of the launcher.

## BRIEF SUMMARY OF THE INVENTION

The present invention is embodied in a toy vehicle launcher that includes a launcher base, a housing attached to the launcher base, a lever attached to the housing at a fulcrum, and a toy vehicle engagement element. The launcher base includes a guide track. The lever includes a loading arm extending from the fulcrum substantially parallel to the launcher base and an effort arm extending from the fulcrum towards the guide track. The lever pivots about the fulcrum from a loading position to a launching position. The toy vehicle engagement element engages with the guide track. The guide track defines a linear path of movement for the toy vehicle engagement element. The toy vehicle engagement element includes a lever engagement channel that engages a distal end of the effort arm and a toy vehicle engagement surface. The toy vehicle engagement surface includes a lower engagement surface and an upper engagement surface.

The present invention is also embodied in a toy vehicle launcher that includes a launcher base, a housing attached to the launcher base, a lever mechanism attached to the housing at a pivot point element, a first contact block and a second contact block. The launcher base includes launcher guidance tracks. The lever mechanism includes an activation arm and a launching arm. The activation arm extends from the pivot point element, and the launching arm extends from the pivot point element towards the launcher guidance tracks. The lever mechanism pivots about the pivot point element from a stationary position to an activated position. The contact blocks engage with the launcher guidance tracks. The launcher guidance tracks define linear paths of movement for the contact blocks. The contact blocks include a contact surface and a lever engagement channel. The contact surface is proximal to a launching end of the launcher guidance track. The lever engagement channels engage a distal end of the launching arm.



The present invention is also embodied in a toy vehicle launcher that includes a launcher base, a housing attached to the launcher base at a bottom end of the housing, a lever attached to the housing at a fulcrum, a biasing element connecting the housing and the lever at the fulcrum, and a toy vehicle engagement element. The launcher base includes a guide track and is configured to rest on a substantially level playing surface. The housing and the launcher base define a toy vehicle launching bay above the guide track. The housing extends upwards from the launcher base to a distal upper end of the housing that is opposite to the bottom end of the housing. The upper end of the housing includes the fulcrum, which is proximate to the upper end of the housing. The lever includes a load arm and an elongated effort arm. The load arm extends horizontally from the fulcrum and substantially parallel to the launcher base. The elongated effort arm extends vertically from the fulcrum through the housing to the toy vehicle launching bay. The lever pivots about the fulcrum between a first loading position and a second launching position with respect to the housing and the launcher base. The biasing element biases the lever to the first loading position. The guide track defines a linear path of movement for the toy vehicle engagement element. The toy vehicle engagement element extends substantially perpendicular to the guide track into the toy vehicle launching bay. The toy vehicle engagement element includes a channel that engages a distal end of the elongated effort arm of the lever.

Other features and advantages of the invention should become apparent from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view of a toy vehicle launcher playlet with a toy vehicle launcher and a toy vehicle in accordance with a first exemplary embodiment.

FIG. **2** is a side view of a toy vehicle launcher system in accordance with a second exemplary embodiment.

FIG. **3** is a perspective view of the second exemplary embodiment of the toy vehicle launcher system.

FIG. **4** is a perspective view of the second exemplary embodiment of the toy vehicle launcher system, with a toy vehicle in a launching position.

FIG. **5** is a perspective view of the second exemplary embodiment of the toy vehicle launcher system with the toy vehicle shortly after launch.

FIG. **6** is a front perspective view of a launching bay of the second exemplary embodiment of the toy vehicle launcher system with the system in a loading configuration.

FIG. **7** is a front perspective view of the launching bay of the second exemplary embodiment of the toy vehicle launcher system with the system in a launching configuration.

FIG. **8** is a bottom view of the second exemplary embodiment of the toy vehicle launcher system with the system in a loading configuration.

FIG. **9** is a side perspective view of an upper portion of the housing of the second exemplary embodiment of the toy vehicle launcher system with one side of the housing removed.

FIG. **10** is a rear perspective view of a lower portion of the housing of the second exemplary embodiment of the toy vehicle launcher system with the housing partially opened.

FIG. **11** is a side perspective view of a lower portion of the housing of the second exemplary embodiment of the toy vehicle launcher system with the housing partially opened.

FIG. **12** is a perspective view of a third exemplary embodiment of the toy vehicle launcher system.

FIG. **13** is a front perspective view of a launching bay of the third exemplary embodiment of the toy vehicle launcher system.

Although the drawings represent varied embodiments and features of the present invention, the drawings are not necessarily to scale and certain features may be exaggerated in order to illustrate and explain exemplary embodiments the present invention. The exemplification set forth herein illustrates several aspects of the invention, in one form, and such exemplification is not to be construed as limiting the scope of the invention in any manner.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

This disclosure describes toy vehicle launchers that translate a substantially vertical activation movement into a substantially lateral movement that launches a toy vehicle. The end of a lever arm used in the activation engages a vertical channel in a toy vehicle engagement mechanism. The vertical channel allows the end of the lever arm to move vertically within the channel with respect to the toy vehicle engagement mechanism as the lever arm rotates and the toy vehicle engagement mechanism moves laterally. The toy vehicle engagement mechanism engages a guide track in a base of the launcher. The guide track defines a lateral path that the toy vehicle engagement mechanism travels when moving between a loading configuration and a launching configuration.

FIG. **1** illustrates a side view of a toy vehicle launcher playset **100** with a toy vehicle **102** and a toy vehicle launcher **104** in accordance with one exemplary embodiment. The toy vehicle launcher playset **100** may be a stand-alone product or may also be part of a larger playset that includes, for example, additional toy vehicle track, toy vehicle stunt devices, or other accessories. The toy vehicle **102** may take various forms, such as a car, automobile, truck, airplane, space ship, boat, submarine, hydroplane, motorcycle, or any wheeled or un-wheeled replica of a vehicle, actual or fiction. The toy vehicle **102** may also take the form of a character with wheels or on a ball bearing. The toy vehicle **102** may be any object of play that a child may want to launch or on which to impart motive force.

The toy vehicle launcher **104** includes a launcher base **106**, a housing **108**, a lever **110**, a biasing element **112**, and a toy vehicle engaging element **114**. The toy vehicle launcher **104** may include physical connections to connect it to a larger play system. The launcher base **106** provides a platform upon which the toy vehicle launcher **104** rests, for example, on a substantially level playing surface. While the launcher base **106** is illustrated as resting on a substantially smooth horizontal playing surface, the launcher base **106** may be configured to rest on other surfaces, whether angled or of various textures (rough, etc.). The launcher base **106** includes a guide track **116**. The guide track **116** may be a linear recess in the floor of the launcher base **106** and may serve to define a linear path of movement for the toy vehicle engagement element **114**. In the illustrated example, the guide track **116** extends through the launcher base **106** from an upper surface of the launcher base **106** to a lower surface of the launcher base **106**. The guide track **116** includes a guide channel **144** that extends between the upper surface and the lower surface of the launcher base **106**. The guide track **116** may also include walls extending from the upper surface of the launcher base **106** that help define a path of travel for both the toy vehicle engaging element **114**, as well as a compartment for holding and defining a path of travel for the toy vehicle **102**. The guide track **116** may also be called a launching guidance track.

The housing **108** includes a fulcrum **118** and a toy vehicle launching bay **120**. The lever **110** attaches to the housing **108** at the fulcrum **118**, and the fulcrum **118** provides a pivot point element about which the lever **110** rotates. The fulcrum **118** may be a peg or post (i.e., a male connector) that interfaces with a hole or recess (i.e., a female connector) in the lever **110**. Alternatively, the fulcrum **118** may be a hole or recess that interfaces with a peg or post in the lever **110**. In some embodiments, the housing **108** is substantially enclosed. For example, there may be minimal openings in the housing for access to the toy vehicle launching bay **120** and a portion of the lever **110**. In other embodiments, the housing **108** may be substantially open. For example, the housing may have two legs extending from the launcher base **106** to the fulcrum **118**, but otherwise provides a user with full access to the lever **110**, fulcrum **118**, and toy vehicle launching bay **120**.

The toy vehicle launching bay **120** provides a compartment or area from which the toy vehicle **102** may be loaded and launched from the toy vehicle launcher **104**. The toy vehicle launching bay **120** may be defined by certain sections of an upper surface of the launcher base **106** and/or certain inner surfaces of the housing **108**. Alternatively, the toy vehicle launching bay **120** may be defined in relation to the path of travel of certain feature of the toy vehicle launcher **104**. For example, the toy vehicle launching bay **120** may be defined as an area through which the toy vehicle engagement element **114** travels when moving from a loading configuration to a launching configuration. The toy vehicle launching bay **120** may be sized to hold and launch a single toy vehicle **102**. As such, it may have a width of slightly more than that of a single toy vehicle **102**. In other embodiments, the toy vehicle launching bay **120** is sized to hold and launch multiple toy vehicles **102** and may have a width of up to slightly more than that of the combined widths of the toy vehicles **102** (e.g., when the loading and launching occurs in parallel). The toy vehicle launching bay may have a height and a depth similarly configured to accommodate one or more toy vehicles **102**. In some embodiments, a depth may be substantially greater than the dimensions of a particular toy vehicle **102**, for example, to provide more of an acceleration pathway for the launch of the toy vehicle **102**. However, a toy vehicle launching bay **120** approximating the dimensions of a toy vehicle **102** may be desirable to optimize production or manufacturing costs. The toy vehicle launching bay **120** may also be defined as the space within the housing over the guide track **116**, as the area over the guide track **116** is intended to be the space where the force imparted to the lever **110** is transferred to the toy vehicle **102**.

The lever **110** includes a loading arm **122** and an effort arm **124** and rotates about the fulcrum **118**. The lever **110** may be a lever mechanism configured to translate force applied in one direction to the loading arm **122** into a force applied in a different direction by the effort arm **124**. The loading arm **122** extends from the fulcrum **118** in a plane parallel to the launcher base **106** and may also be called a

load arm or an activation arm. In other embodiments, the loading arm **122** may extend away from the fulcrum not necessarily parallel to the launcher base **106**. In some embodiments, the loading arm **122** terminates in a handle. In other embodiments, the loading arm **122** terminates in a platform with a relatively large surface area. In the illustrated embodiment, the loading arm **122** extends beyond the perimeter of the housing **108**. In other embodiments, the loading arm **122** remains within the perimeter of the housing **108**, but is accessible via a hole or opening in the housing **108**. The effort arm **124** extends from the fulcrum **118** towards the guide track **116** and may also be called a launching arm. The effort arm **124** terminates in a distal end **126** of the effort arm **124** that is proximate to the guide track **116**.

The degree of rotation available to the lever **110** may be limited by features of the housing **108**. The housing **108** may limit the degree of rotation of the lever **110** by the size or length of certain openings within the housing. For example, the size or shape of an opening through which the loading arm **122** exits the housing **108** may define how far the loading arm **122** may travel. Similarly, the size or shape of an opening through which the effort arm **124** extends into the toy vehicle launching bay **120** may define how far the effort arm **124** may travel. Additional features on the inner housing surface, such as nubs or posts, may also serve to define the degree of rotation available to the lever **110** within the housing **108**. As illustrated, the lever **110** may rotate between a first position A and a second position B, as shown with the distal ends of the loading arm **122** and the effort arm **124**. The first position A may also be called a loading or stationary position; the second position B may also be called a launching or activated position.

The biasing element **112** connects the lever **110** and the housing **108**. In the illustrated embodiment, the biasing element **112** connects the lever **110** and the housing **108** at the fulcrum **118**. In other embodiments, the biasing element may be a spring or elastic band attaching the lever **110** to the housing **108** at one of the lever arms. The biasing element **112** biases the lever **110** to a particular position with respect to the housing **108**, such as the first position A. Thus, when an external force F acting upon the lever is removed, the biasing element **112** returns the lever to the first position A. In some embodiments, the biasing element **112** is optional. In those embodiments without the biasing element **112** and where no other biasing element is provided in the system, a user may manually move the lever **110** from first position A to second position B and back to first position A.

The toy vehicle engagement element **114** includes a toy vehicle engagement surface **128**, a lever engagement channel **130**, and a guide track engagement element **132**. The toy vehicle engagement element **114** translates rotational movement of the lever **110** into a substantially lateral movement that transfers to and launches the toy vehicle **102**. The toy vehicle engagement surface **128** is oriented in the direction of the toy vehicle **102** launch, and engages or contacts the toy vehicle **102** to transfer energy during the launch. The toy vehicle engagement surface **128** may take different forms and may also be called a contact surface. The toy vehicle engagement surface **128** may be substantially normal or orthogonal to the upper surface of the launcher base **106**, or it may have a shape (e.g., contoured) that better conforms to contacting the toy vehicle **102**. The toy vehicle engagement element **114** may also be called a contact block.

The lever engagement channel **130** includes forward engagement surface **134** and a rear engagement surface **136**. The lever engagement channel **130** extends generally normal to the launcher base **106** and engages the distal end **126** of the effort arm **124**. When the lever **110** transitions from the first position A to the second position B, the distal end **126** of the effort arm **124** engages or contacts the forward engagement surface **134** and pushes the toy vehicle engagement element **114** forward or in a direction V of the toy vehicle **102** launch. When the lever **110** transitions from the second position B back to the first position A, the distal end **126** of the effort arm **124** engages or contacts the rear engagement surface **136** and pushes the toy vehicle engagement element **114** back or in the direction opposite of the toy vehicle **102** launch.

The guide track engagement element **132** connects the toy vehicle engagement element **114** to the guide track **116** and may take various forms, which may include ball bearings, magnets, or other mechanisms to movably couple two components to each other. The guide track engagement element **132** may limit a vertical component of an energy transfer while translating a horizontal component of the energy transfer from the lever **110** to a toy vehicle **102**. The illustrated guide track engagement element **132** includes an upper flange **138**, a web plate **140**, and a lower flange **142**. The upper flange **138** engages an upper surface of the launcher base, but is free to slide along within the guide track **116**. The lower flange **142** engages a lower surface of the launcher base, but is also free to slide along the guide track **116**. The web plate **140** extends through the guide channel **144** and connects the upper flange **138** and the lower flange **142**. The combination of the upper flange **138**, lower flange **142**, and the web plate **140** in relation to the guide track **116** define the tolerances for the directional components of energy transfer, and preferably substantially limit the transfer of energy to a substantially horizontal and one-dimensional path of travel for the toy vehicle engagement element **114**.

In an exemplary operation of the toy vehicle launcher playset **100**, a user loads a toy vehicle **102** into the toy vehicle launcher **104** by inserting the toy vehicle **102** into the toy vehicle launching bay **120**. The toy vehicle **102** initially comes to rest in front of the toy vehicle engagement surface **128** of the toy vehicle engagement element **114**. The lever **110** of the toy vehicle launcher **104** begins in the loading position A due to the biasing force of the biasing element **112**. The user aims the toy vehicle launcher playset **100** at a target and/or connects the toy vehicle launcher playset **100** to another playset or a track set. The user may rest the launcher base **106** against a support surface as part of the aiming process.

Once the user completes the aiming process, the user applies a substantially vertical force F to a distal end of the loading arm **122** of the lever **110**, for example by pushing down on a platform at the end of the loading arm **122**. The force F temporarily overcomes the biasing force of the biasing element **112** and rotates the lever **110** about the fulcrum **118** from the loading position A to the launching position B. The application of the force F not only rotates the distal end of the loading arm **122**, but also rotates the distal end **126** of the effort arm **124**.

As the lever **110** rotates from the loading position A to the launching position B, the distal end **126** of the effort arm **124** contacts and applies force to the forward engagement surface **134** of the lever engagement channel **130**. The force applied to the forward engagement surface **134** propels the toy vehicle engagement element **114** forward towards a front of the toy vehicle launching bay **120** in the direction of the user's aim. As the applied force propels the toy vehicle engagement element **114** forward, the toy vehicle engage-

ment surface **128** engages with the toy vehicle **102** and transfers part of the applied force to the toy vehicle **102**, thus propelling the toy vehicle **102** forward in the direction of the user's aim with a particular velocity vector V.

Because the lever **110** moves in a rotational motion, the distal end **126** of the effort arm **124** experiences some vertical displacement along with some horizontal displacement as it travels between the loading position A and the launching position B. As illustrated, the distal end **126** begins at a first distance dA above the launcher base **106** when the lever **110** is in the loading position A. The distal end **126** ends at a second distance dB above the launcher base **106** when the lever **110** is in the launching position B.

In a typical configuration or in embodiments similar to the one illustrated, the distal end **126** moves to a vertical position higher than when it began. That is, the second distance dB is greater than the first distance dA. So, if the toy vehicle **102** were placed in direct contact with the lever arm **110**, instead of indirectly through a toy vehicle engagement element **114**, some force from the vertical displacement of the distal end **126** would transfer to the toy vehicle **102**, and the toy vehicle **102** would be partially lifted by its contact with the distal end **126**. If the partial lift were not a desirable feature, then a dampener may be placed above the exit of the launcher to remove the vertical component of the force applied to the toy vehicle **102** and keep the toy vehicle **102** moving in a forward direction. However, because the lever **110** engages with the toy vehicle engagement element **114** and the toy vehicle engagement element **114** is attached to the guide track **116**, the toy vehicle engagement element **114** and the toy vehicle **102** experience a substantially horizontal displacement D. The substantially horizontal displacement D occurs without much, if any, of a vertical component, while allowing for and/or absorbing the vertical displacement of the distal end **126** of the effort arm **124**.

Upon abatement of the vertical force F on the distal end of the loading arm **122** (e.g., when the user releases the loading arm **122**), the biasing force from the biasing element **112** reasserts itself and rotates the lever **110** back to the loading position A from the launching position B. As the lever **110** rotates back to the loading position A, the distal end **126** of the effort arm **124** contacts and exerts a return force on the rear engagement surface **136** of the lever engagement channel **130**. The return force moves the toy vehicle engagement element **114** back to the rear of the toy vehicle launching bay **120**, and the system resets itself for the next loading and launching of a toy vehicle **102**.

FIG. **2** is a side view of a toy vehicle launcher system **200** in accordance with a second exemplary embodiment. Similar to the first exemplary embodiment, the toy vehicle launcher system **200** includes a toy vehicle **202** (shown in FIGS. **4** and **5**) and a toy vehicle launcher **204**. The toy vehicle launcher **204** includes a launcher base **206**, a housing **208**, and a lever **210**. The inside of the housing **208** includes a fulcrum **218**. The lever **210** includes a loading arm **222** and an effort arm **224**. The lever **210** as shown is in a loading position A.

FIG. **3** is a perspective view of the second exemplary embodiment of the toy vehicle launcher system **200**. The housing **208** further includes a toy vehicle launching bay **220**. The launcher base **206** further includes a guide track **216**. The guide track **216** includes a guide channel **244** that extends between an upper surface and a lower surface of the launcher base **206**.

FIG. **4** is a perspective view of the second exemplary embodiment of the toy vehicle launcher system **200** shown with a toy vehicle **202** in a launching position. The toy vehicle **202** is shown already inside the toy vehicle launching bay **220**. The distal end of the loading arm **222** of the lever is shown terminating in a planar surface substantially parallel to the launcher base **206**. The planar surface provides a larger area with which a user may engage to provide the substantially vertical force F that triggers the launch of the toy vehicle **102**.

FIG. **5** is a perspective view of the second exemplary embodiment of the toy vehicle launcher system **200** with the toy vehicle **202** shortly after launch. FIG. **5** shows a user applying a substantially vertical force F to a distal end of the loading arm **222**. The force causes the loading arm **222** and the lever **210** to rotate from a first position A to a second position B. The rotation from the first position A to the second position B drives a toy vehicle engagement element **214** forward toward a front of the toy vehicle launching bay **220**. The toy vehicle engagement element **214** engages or contacts the toy vehicle **202** and launches the toy vehicle **202** from the toy vehicle launcher **208** with a particular velocity vector V.

FIG. **6** is a front perspective view of the toy vehicle launching bay **220** of the second exemplary embodiment of the toy vehicle launcher system **200** with the system in a loading configuration. The toy vehicle launching bay **220** rests above a guide track **216** in the launcher base **206**. Various surfaces of the launcher base **206** and the housing **208** define the toy vehicle launching bay **220**. The toy vehicle engagement element **214** engages with the guide track **216** via a guide track engagement element **232**. The guide track engagement element **232** includes an upper flange **238** and a lower flange **242** that are connected by a web plate **240**. The upper flange **238** and lower flange **242** engage with an upper surface and a lower surface of the launcher base **206**, respectively, around the guide track **216**. The upper flange **238** and lower flange **242** slide across their corresponding surfaces of the launcher base **206** as the toy vehicle engagement element **214** moves within the guide track **216**. The web plate **240** extends through a guide channel **244** in the guide track **216**.

The toy vehicle engagement element **214** further includes a toy vehicle engagement surface **228** and a lever engagement channel **230**. The toy vehicle engagement surface **228** contacts and launches a toy vehicle **202** in the toy vehicle launching bay **220** when the toy vehicle engagement element **214** moves from a loading configuration, shown in FIG. **6**, to a launching configuration shown in FIG. **7**. The lever engagement channel **230** extends normal to the guide track **216** behind the toy vehicle engagement surface **228**. A distal end **226** of the effort arm **224** of the lever **210** extends through the housing **208** and into the toy vehicle launching bay **220**. The distal end **226** of the effort arm **224** engages with the lever engagement channel **230** in the toy vehicle engagement element **214**. The distal end **226** includes a protrusion **246** to provide additional surface area and stability with which the distal end **226** may engage with the lever engagement channel **230**. A longitudinal axis of the protrusion **246** may be substantially parallel to the launcher base.

FIG. **7** is a front perspective view of the launching bay **220** of the second exemplary embodiment of the toy vehicle launcher system **200** with the system in a launching configuration. The lever **210** transitions from a loading position A to a launching position B as the system **200** transitions from the loading configuration to the launching configuration. The toy vehicle engagement surface **228** includes an upper engagement surface **248** and a lower engagement surface **250**. Of the two, the upper engagement surface **248**

is distal the launcher base **206**, while the lower engagement surface **250** is proximate the launcher base **206**. One or both of the upper engagement surface **248** and the lower engagement surface **250** may be angled slightly toward a launching end of the guide track **216**. The angle allows the toy vehicle engagement surface **228** to engage with the toy vehicle **202** at an acute angle during launch and/or provide a small roof or ceiling. The acute angle and small roof help to absorb vertical energy in the system and direct the toy vehicle **202** in a more lateral direction during launch.

FIG. **8** is a bottom view of the second exemplary embodiment of the toy vehicle launcher system **200** with the system in a loading configuration. The launcher base **206** includes the guide track **216** with the guide channel **244**. The lower flange **242** of the guide track engagement element **232** engages with a lower surface of the launcher base **206** and connects to the remainder of the toy vehicle engagement element **214** via the web plate **240** that extends through the guide channel **244**.

FIG. **9** is a side perspective view of an upper portion of the housing **208** of the second exemplary embodiment of the toy vehicle launcher system **200** with one side of the housing removed. The lever **210** pivots within the housing **208** about the fulcrum **218** from a first position A to a second position B upon application of a downward vertical force F on the distal end of the loading arm **222** of the lever **210**. A torsion spring **212** biases the lever **210** to the first position A and returns the lever to the first position A after the force F is removed. The torsion spring **212** attaches to the lever at a point P**1** and to the housing **208** at a point P**2**.

FIG. **10** is a rear perspective view of a lower portion of the housing **208** of the second exemplary embodiment of the toy vehicle launcher system **200** with the housing **208** partially opened. The distal end **226** of the effort arm **224** extends through the housing towards the launcher base **206**. The protrusion **246** engages with the lever engagement channel **230**. When the lever **210** transitions from the first position A to the second position B, the protrusion **246** engages with the forward engagement surface **234** of the lever engagement channel **230** to move the toy vehicle engagement element **214** forward towards the front of the toy vehicle launching bay **220**. When the lever **210** transitions from the second position B to the first position A, the protrusion **246** engages with the rear engagement surface **236** of the lever engagement channel **230** to move the toy vehicle engagement element **214** back towards the rear of the toy vehicle launching bay **220**. The toy vehicle engagement element **214** is illustrated in FIG. **10** at a position approximately mid-way between a loading configuration and a launching configuration. The lever engagement channel **230** includes vertical space for the protrusion to move vertically without obstruction within the lever engagement channel **230**, and thus the lever engagement channel **230** is able to absorb vertical movement from the lever **210** without passing it through to the toy vehicle **202**.

FIG. **11** is a side perspective view of a lower portion of the housing **208** of the second exemplary embodiment of the toy vehicle launcher system **200** with part of the housing **208** removed. The launcher system **200** is shown in a launching configuration. The toy vehicle engagement surface **228** is angled slightly towards the launching end of the guide track **216**. The upper engagement surface **248** is angled more towards the launching end of the guide track **216** than the lower engagement surface **250**.

FIG. **12** is a perspective view of a third exemplary embodiment of a toy vehicle launcher system **300**. The third embodiment of the toy vehicle launcher system **300** is similar to the previous two exemplary embodiments, however, the toy vehicle launcher system **300** launches two toy vehicles **302**. Like the previous embodiments, the toy vehicle launcher system **300** includes a toy vehicle launcher **304**. The toy vehicle launcher **304** includes a launcher base **306**, a housing **308**, and a lever **310**. The housing **308** includes a fulcrum **318** distal to the launcher base **306** about which the lever **310** pivots. Certain surfaces of the launcher base **306** and the housing **308** define a toy vehicle launching bay **320** in which the two toy vehicles **302** are shown loaded.

FIG. **13** is a front view of the toy vehicle launching bay **320** of the third exemplary embodiment of the toy vehicle launcher system **300** in a loading configuration. The toy vehicle launching bay **320** rests above two guide tracks **316** in the launcher base **306**. Various surfaces of the launcher base **306** and the housing **308** define the toy vehicle launching bay **320**. The toy vehicle launching bay **320** includes two toy vehicle engagement elements **314** that engage with the two guide tracks **316** via respective guide track engagement elements **332** and guide channels **344**. The distal end **326** of an effort arm of the lever **310** includes two protrusions **346** that are substantially parallel to the upper surface of the launcher base **306**. The two protrusions **346** each engage a respective lever engagement channel **330** on their respective toy vehicle engagement elements **314**. Each of the toy vehicle engagement elements **314** has a respective toy vehicle engagement surface **328**, which may be substantially perpendicular to the upper surface of the launcher base **306** or may be angled.

In other embodiments, a dual toy vehicle launcher may include a single toy vehicle engagement element with a single toy vehicle engagement surface that engages both toy vehicles during launch. A dual toy vehicle launcher may have a single toy vehicle engagement element with two separate toy vehicle engagement surfaces that each engages a respective toy vehicle during launch. The dual toy vehicle launcher may include a single guide track or two guide tracks. The distal end of the lever arm may split into two components, each of which engages a different toy vehicle engagement element.

It should be appreciated from the foregoing description that the present invention provides a toy vehicle launcher that translates a substantially vertical actuation motion to an improved substantially lateral launching of a toy vehicle.

Specific methods, devices, and materials are described, although any methods and materials similar or equivalent to those described can be used in the practice or testing of the present embodiment. Unless defined otherwise, all technical and scientific terms used herein have the same meanings as commonly understood by one of ordinary skill in the art to which this embodiment belongs. Without further elaboration, it is believed that one skilled in the art, using the proceeding description, can make and use the present invention to the fullest extent.

The invention has been described in detail with reference only to the presently preferred embodiments. Persons skilled in the art will appreciate that various modifications can be made without departing from the invention. Accordingly, the invention is defined only by the following claims.

We claim:

**1**. A toy vehicle launcher comprising:

a launcher base providing a platform having a horizontal upper surface and a horizontal lower surface, the launcher base including a guide track in the platform of the launcher base, the guide track being a linear recess in the platform that extends vertically through both the

horizontal upper surface of the platform and the horizontal lower surface of the platform;

a housing attached to the launcher base, the housing including a fulcrum distal to the launcher base;

a lever attached to the housing at the fulcrum, the lever including a loading arm extending from the fulcrum parallel to the launcher base and an effort arm extending from the fulcrum towards the guide track, the lever pivotable about the fulcrum from a loading position to a launching position; and

a toy vehicle engagement element engaged with the guide track through a guide track engagement element that includes a web plate extending vertically through the guide track and a lower flange attached to the web plate such that the lower flange engages the horizontal lower surface of the platform of the launcher base, the guide track defining a linear path of movement for the toy vehicle engagement element, the toy vehicle engagement element including:

a lever engagement channel that engages a distal end of the effort arm, and

a toy vehicle engagement surface angled towards a launching end of the guide track from being perpendicular to the launcher base, the toy vehicle engagement surface including a lower engagement surface proximate the launcher base and an upper engagement surface distal the launcher base, the upper engagement surface angled more towards the launching end than the lower engagement surface.

**2**. The toy vehicle launcher of claim **1**, where the lever engagement channel extends normal to the launcher base, such that the distal end of the effort arm is at a first distance in the lever engagement channel from the launcher base in the loading position and at a second distance in the lever engagement channel from the launcher base in the launching position, where the first distance and the second distance differ.

**3**. The toy vehicle launcher of claim **1**, where the lever engagement channel includes a forward engagement surface and a rear engagement surface, such that the distal end of the effort arm engages the forward engagement surface when the lever transitions from the loading position to the launching position and engages the rear engagement surface when the lever transitions from the launching position to the loading position.

**4**. The toy vehicle launcher of claim **1**, where the guide track defines the linear path between a loading end and the launching end, and where the loading position of the lever is defined where the distal end of the effort arm engages the toy vehicle engagement element at a position proximate to the loading end of the linear path and the launching position of the lever is defined where the distal end of the effort arm engages the toy vehicle engagement element at a position proximate to the launching end of the linear path.

**5**. The toy vehicle launcher of claim **1**, where the distal end of the effort arm includes at least one protrusion parallel to the launcher base that engages the toy vehicle engagement element.

**6**. The toy vehicle launcher of claim **1**, where the guide track engagement element further includes an upper flange attached to the web plate such that the upper flange engages the horizontal upper surface of the platform of the launcher base.

**7**. The toy vehicle launcher of claim **6**, where an upper surface of the upper flange is co-planar with the horizontal upper surface of the platform of the launcher base.

**8**. The toy vehicle launcher of claim **1**, where the toy vehicle engagement element is a first toy vehicle engagement element, the toy vehicle launcher further comprising a second toy vehicle engagement element.

**9**. The toy vehicle launcher of claim **8**, where the guide track is a first guide track, the toy vehicle launcher further comprising a second guide track in the launcher base parallel to the first guide track, the second toy vehicle engagement element engaged with the second guide track.

**10**. The toy vehicle launcher of claim **1** further comprising a biasing element connecting the housing and the lever at the fulcrum, the biasing element biasing the lever to the loading position from the launching position.

**11**. A toy vehicle playset comprising:

a toy vehicle; and

the toy vehicle launcher of claim **1**.

**12**. The toy vehicle playset of claim **11**, where the toy vehicle engagement surface of the toy vehicle launcher is configured to direct the toy vehicle in a lateral direction when the lever of the toy vehicle launcher is pivoted about the fulcrum to the launching position.

**13**. A toy vehicle launcher comprising:

a launcher base providing a platform having a horizontal upper surface and a horizontal lower surface, the launcher base including a first launcher guidance track in the platform of the launcher base and a second launcher guidance track in the platform of the launcher base, each of the first launcher guidance track and the second launcher guidance track being a linear recess in the platform that extends vertically through both the horizontal upper surface of the platform and the horizontal lower surface of the platform;

a housing attached to the launcher base, the housing including a pivot point element distal to the launcher base;

a lever mechanism attached to the housing at the pivot point element, the lever mechanism including an activation arm extending from the pivot point element and a launching arm extending from the pivot point element towards the launcher guidance tracks, the lever mechanism pivotable about the pivot point element from a stationary position to an activated position;

a first contact block engaged with the first launcher guidance track via a first guide track engagement element that includes a first web plate extending vertically through the first launcher guidance track and a first lower flange attached to the first web plate such that the first lower flange engages the horizontal lower surface of the platform of the launcher base, the first launcher guidance track defining a first linear path of movement for the first contact block, the first contact block including a first lever engagement channel that engages a distal end of the launching arm, and a first contact surface proximal to a first launching end of the first launcher guidance track; and

a second contact block engaged with the second launcher guidance track via a second guide track engagement element that includes a second web plate extending vertically through the second launcher guidance track and a second lower flange attached to the second web plate such that the second lower flange engages the horizontal lower surface of the platform of the launcher base, the second launcher guidance track defining a second linear path of movement for the second contact block, the second contact block including a second lever engagement channel that engages the distal end of

the launching arm, and a second contact surface proximal to a second launching end of the second launcher guidance track.

**14**. The toy vehicle launcher of claim **13**, where the activation arm terminates in a planar surface parallel to the launcher base.

**15**. The toy vehicle launcher of claim **13**, where the launching arm is longer than the activation arm.

**16**. The toy vehicle launcher of claim **13** further comprising a torsion spring connecting the housing and the lever mechanism at the pivot point element, the torsion spring biasing the lever mechanism to the stationary position.

**17**. The toy vehicle launcher of claim **13**, where the first contact surface and the second contact surface are co-planar.

**18**. The toy vehicle launcher of claim **13**, where the first launcher guidance track and the second launcher guidance track are parallel.

**19**. The toy vehicle launcher of claim **13**, where the distal end of the launching arm includes a first protrusion and a second protrusion, the first protrusion engaging the first lever engagement channel of the first contact block, and the second protrusion engaging the second lever engagement channel of the second contact block.

**20**. The toy vehicle launcher of claim **13**, where the first guide track engagement element further includes a first upper flange attached to the first web plate such that the first upper flange engages the horizontal upper surface of the platform of the launcher base, and where the second guide track engagement element further includes a second upper flange attached to the second web plate such that the second upper flange engages the horizontal upper surface of the platform of the launcher base.

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